a cover which sealingly contacts the substrate surface about the hybridization region, wherein the cover and the hybridization region form an enclosure having an interior space comprising a hybridization chamber; and

(b) introducing into the hybridization chamber a sample fluid comprising (i) a target molecule which may hybridize to a surface-bound molecular probe within the hybridization region, (ii) a hybridization buffer, and (iii) a surfactant of a type and present at a concentration effective to substantially reduce nonspecific binding and promote mixing of components within the sample fluid; and

(c) maintaining hybridization conditions within the hybridization chamber for a period of time sufficient to allow hybridization between the target molecule and a surface-bound molecular probe to occur;

wherein the surfactant is a polymeric nonionic surfactant which is polyethylene oxide.

52. The method of claim 51, wherein the hybridization chamber has a volume in the range of about 0.2 μl to about 312 μl.

53. The method of claim 52, wherein the hybridization chamber has a volume in the range of about 1 μl to about 200 μl.

54. The method of claim 52, wherein the hybridization region has an area in the range of about 4 mm^2 to about 500 mm^2.

55. The method of claim 53, wherein the hybridization region has an area in the range of about 20 mm^2 to about 350 mm^2.

56. (AMENDED) The method of claim 51, wherein the surfactant additionally comprises a surfactant selected from the group consisting of anionic surfactants, cationic surfactants, amphoteric surfactants, and combinations thereof.

57. (AMENDED) The method of claim 56, wherein the additional surfactant is an anionic surfactant.

58. The method of claim 57, wherein the anionic surfactant is a sodium, potassium, ammonium or lithium salt of lauryl sulfate.

59. The method of claim 58, wherein the anionic surfactant is lithium lauryl sulfate.

63. The method of claim 51, wherein the surfactant represents in the range of approximately 0.1 wt.% to 10 wt.% of the sample fluid.

64. The method of claim 63, wherein the surfactant represents in the range of approximately 0.5 wt.% to 5 wt.% of the sample fluid.

65. The method of claim 64, wherein the surfactant represents in the range of approximately 0.75 wt.% to 5 wt.% of the sample fluid.

66. The method of claim 51, wherein the surfactant comprises a combination of polyethylene oxide and lithium lauryl sulfate, and further wherein the polyethylene oxide represents up to about 1 wt.% of the sample fluid and the lithium lauryl sulfate represents up to about 0.5 wt.% of the sample fluid.

67. The method of claim 51, wherein an air bubble is present within the hybridization chamber.

69. (NEW) A method according to claim 51 wherein the surface is a silane functionalized surface.

70. (NEW) A method according to claim 56 wherein the surface is a silane functionalized surface.

71. (NEW) A method according to claim 58 wherein the surface is a silane functionalized surface.